

WHAT IS CLAIMED IS:

1           1. A cardiac electrode deployment device comprising:  
2           a support; and  
3           an electrode structure deployable from the support, said electrode structure  
4 including a planar region and a conformable, raised center region, wherein electrode surfaces  
5 on the planar region and on the center region are electrically isolated from each other.

1           2. A device as in claim 1, wherein the electrode structure comprises an  
2 electrically conductive base and an electrically conductive dome attached to an electrically  
3 insulative spacer from the base.

1           3. A device as in claim 2, wherein the electrically conductive base is a  
2 compliant web and the conductive dome is a soft matrix attached to and projecting from the  
3 web.

1           4. A device as in claim 3, wherein the electrode structure can be shifted  
2 between a low profile configuration where it can be intercostally introduced to a region over  
3 the heart and an open configuration where the electrode surfaces can be engaged against the  
4 heart.

1           5. A device as in claim 4, wherein support comprises a shaft having a  
2 proximal end and a distal end and the electrode structure comprises a plurality of struts  
3 reciprocatably attached to the distal end of the shaft, said struts being retractable to a radially  
4 contracted configuration and advancable along arcuate, diverging paths to deploy the  
5 electrode surfaces to non-traumatically engage the heart when advanced thereagainst,  
6 wherein the compliant web is secured to the struts to advance the electrode surfaces when the  
7 struts are advanced.

1           6. A device as in claim 5, wherein the compliant web is supported solely  
2 by the struts and the dome is supported solely by the web.

1           7. A device as in claim 1, further comprising a non-conductive, fixed rod  
2 which is coupleable to the center region and advancable from a distal end of the support to  
3 urge the center region forward as the electrode surfaces are advanced against the heart.

1               8.     A device as in claim 7, further comprising a spring attached to the  
2 distal end of the support to provide a spring loaded advancement of the fixed rod.

1               9.     A device as in claim 1, wherein at least one of the electrode surfaces of  
2 the electrode structure comprises a plurality of electrically isolated segments and wherein the  
3 support includes separate electrical conduction paths for connecting the isolated segments of  
4 the electrode structure to an external power supply controller.

1               10.    A device as in claim 1, wherein the support comprises a first  
2 electrically conductive path for connecting the electrode surface on the planar region to an  
3 external power supply controller and a second electrically conductive path isolated from the  
4 first path for connecting the electrode surface of the center region to the external power  
5 supply controller.

1               11.    A system comprising:  
2                a support;  
3                an electrode structure deployable from the support, said electrode structure  
4 including a planar region and a conformable, raised center region, wherein electrode surfaces  
5 on the planar region and on the center region are electrically isolated from each other;  
6                a power supply controller; and  
7                wherein the support comprises a first electrically conductive path for  
8 connecting the electrode surface on the planar region to the external power supply controller  
9 and a second electrically conductive path isolated from the first path for connecting the  
10 electrode surface of the center region to the external power supply controller.

1               12.    A system as in claim 11, further comprising a paired counter electrode.

1               13.    A system as in claim 12, further comprising a switch on the power  
2 supply controller to allow a user to switch the mode of operation between bipolar functioning  
3 for sensing or pacing treatment and unipolar functioning for defibrillation treatment.

1               14.    A cardiac electrode deployment device comprising:  
2                a support having a proximal end, a distal end, and a blunt tip;  
3                a first electrode structure deployable from the distal end of the support, said  
4 first electrode structure including a planar region; and

5                   a second electrode structure attached to the blunt tip, said second electrode  
6                   structure having a conformable, raised center region, wherein electrode surfaces on the first  
7                   and second electrode structures are electrically isolated from each other.

1                   15. A device as in claim 14, wherein the first electrode structure comprises  
2                   an electrically conductive base and the second electrode structure comprises an electrically  
3                   conductive dome.

1                   16. A device as in claim 15, wherein the electrically conductive base is a  
2                   compliant web and the conductive dome is a soft matrix or mesh disposed over the blunt tip.

1                   17. A device as in claim 16, wherein the first electrode structure comprises  
2                   a plurality of struts reciprocatably attached to the distal end of the shaft, said struts being  
3                   retractable to a radially contracted configuration and advancable along arcuate, diverging  
4                   paths to deploy the first electrode surface to non-traumatically engage the heart when  
5                   advanced thereagainst, wherein the compliant web is secured to the struts to advance the first  
6                   electrode surface when the struts are advanced.

1                   18. A device as in claim 17, wherein the compliant web is supported solely  
2                   by the struts and the dome is supported solely by the blunt tip.

1                   19. A device as in claim 18, wherein the blunt tip extends from the most  
2                   distal end of the shaft by a rod.

1                   20. A device as in claim 19, wherein the blunt tip is formed from a soft,  
2                   biocompatible foam.

1                   21. A device as in claim 19, wherein the blunt tip is formed entirely from a  
2                   soft conductive mesh.

1                   22. A device as in claim 19, further comprising a force gauge,  
2                   accelerometer, impedance sensor, piezoelectric crystal, or oximeter coupled to the blunt tip or  
3                   dome.

1                   23. A method for electrically contacting a heart, said method comprising:  
2                   percutaneously introducing an electrode structure against the heart;

3                   establishing a first electrically conductive path to the heart through a first  
4                   electrode surface on a planar region of the electrode structure;  
5                   establishing a second electrically conductive path to the heart through a  
6                   second electrode surface on a raised center region of the electrode structure, wherein the first  
7                   and second electrode surfaces are electrically isolated from each other; and  
8                   establishing an electrical circuit between the first and second electrically  
9                   conductive paths.

1                   24.       A method as in claim 23, wherein establishing a circuit comprises  
2                   taking an EKG of the heart.

1                   25.       A method as in claim 23, wherein establishing a circuit comprises  
2                   pacing the heart.

1                   26.       A method as in claim 23, wherein establishing a circuit comprises  
2                   applying energy in a bipolar fashion through the first and second isolated electrode surfaces.

1                   27.       A method as in claim 23, wherein establishing the first electrically  
2                   conductive path comprises engaging an electrically conductive compliant web against the  
3                   heart and establishing the second electrically conductive path comprises engaging a soft  
4                   dome-like matrix coupled to and projecting from the web against the heart.

1                   28.       A method as in claim 27, further comprising advancing the dome-like  
2                   matrix to protrude distally of the compliant web.

1                   29.       A method as in claim 23, wherein the first electrically conductive path  
2                   comprises engaging an electrically conductive compliant web against the heart and  
3                   establishing the second electrically conductive path comprises engaging a soft dome-like  
4                   matrix disposed over a blunt tip against the heart.

1                   30.       A method as in claim 29, wherein introducing the electrode structure  
2                   comprises bluntly dissecting intercostal tissue with the blunt tip.

1                   31.       A method as in claim 23, further comprising compressing the heart by  
2                   contacting the electrode structure against the heart and pressing the electrode structure to  
3                   cause compression of the heart.

1                   32. A method as in claim 31, wherein compression is in an anterior-  
2       posterior direction.

1                   33. A method as in claim 31, wherein the electrode structure is introduced  
2       intercostally in a low profile configuration and subsequently expanded over the heart.

1                   34. A method as in claim 31, wherein compressing the heart comprises  
2       repetitively compressing the heart at from 40 to 160 repetitions per minute.

1                   35. A method as in claim 23, further comprising contacting a patient's  
2       back with a counter electrode and applying defibrillation energy between the electrode  
3       structure on the heart and the counter electrode on the patient's back to defibrillate the heart.

1                   36. A method as in claim 35, wherein applying defibrillation energy  
2       comprises switching the mode of operation on a power supply connected to the electrode  
3       structure and the counter electrode.

1                   37. A kit comprising:  
2       a cardiac electrode deployment device; and  
3       instructions for use setting forth a method according to claim 23.